



Department of the Air Force
HQ AEDC (AFMC)
Arnold AFB, TN 37389

Safety, Health, and Environmental Standard

Title: Lockout/Tagout – LOTO

Standard No.: B2

Effective Date: 12/30/04

The provisions and requirements of this standard are mandatory for use by all personnel engaged in work tasks necessary to fulfill the AEDC mission. Please contact your safety, industrial health and/or environmental representative for clarification or questions regarding this standard.

Approved:


Director, Safety and Health
ATA


Air Force Functional Chief

Record of Review/Revision

[illegible]



Safety, Health, and Environmental Standard

Lockout/Tagout (LOTO)

1.0 INTRODUCTION/PURPOSE

All employees who may be exposed to energized or potentially energized equipment shall be properly protected from the unexpected energization or startup of that equipment. This standard establishes minimum requirements for lockout of energy isolating devices whenever maintenance or servicing is done on equipment, machines, and/or systems.

Note: *At no time shall a DANGER TAG alone be considered adequate lockout/tagout protection.*

2.0 SCOPE/APPLICATION

This standard applies to the control of hydraulic, pneumatic, steam, mechanical, and low-voltage electrical systems (less than or equal to 600 V); powered machinery; and hazardous gases, utility systems or other energy sources that could cause hazards to personnel due to unexpected startup or release. It also applies to any situation that could result in damage to equipment, where personnel could be exposed to hazards due to unexpected startup of machines or equipment, or that could result in the release of stored energy or hazardous gases. It shall be used to ensure that any equipment, machine, or system is stopped, isolated from all potentially hazardous energy sources, and locked out before employees perform any servicing or maintenance operation. In the most abbreviated form, lockout/tagout consists of the following 10 steps:

1. *Identifying all energy sources and procedure development.* An initial survey shall be made to identify all the system/equipment's sources of power or energy (including stored energy sources such as electrical capacitors, springs, or elevated movable components) so that each energy source can be isolated. At this time a procedure shall be developed to serve as the basic plan for a safe control of energy during maintenance, repair and servicing.
2. *Notifying all affected employees.* Everyone who would normally use the equipment being serviced shall be informed of the LOTO procedures being used and instructed not to attempt to start or energize the equipment.
3. *Shutting down equipment.* Using appropriate equipment shutdown procedures, all controls shall be turned off.
4. *Locking out equipment.* Locks shall be applied to isolate each power source and prevent the operation of the equipment controls. One lock shall be applied to each point of protection by each person working on the equipment (simple lockout) or a single lock per person when using a lockbox.
5. *Applying danger tags.* **Both lockout AND tagout shall be required except where the equipment and its energy supply cannot accept a lock, in which case ALTERNATE MEANS OF PROTECTION THAT ARE EQUALLY AS EFFECTIVE AS A LOCK SHALL BE USED.** The lock and tag may be integrated/combined if all information is included. Tags shall indicate the reason the lock is applied, the name and telephone number of the person placing the lock, and the date that the lock is being placed.
6. *Releasing or blocking any stored energy or movable parts.* Any stored energy that may remain in the system shall be safely released. This may include draining charge out of a capacitor, blocking and bleeding down a steam line, or lowering elevated components that may fall. Equipment components that may move and injure someone shall be physically blocked in place.
7. *Verifying lockout.* Determination that energy sources have been effectively controlled shall be accomplished by first checking that no one is exposed and then attempting to operate the equipment using the normal controls, then returning to neutral. This step shall be a check or a test of isolation effort to prove that the energy has been controlled. Appropriate test equipment and/or visual inspection shall be used to verify that the stored energy sources have been effectively isolated. If there is a possibility that stored energy could re-accumulate to a hazardous level, verification of the lockout shall continue until work is completed or until the possibility of such re-accumulation no longer exists.

8. *Conducting the desired work on the system/equipment.*
9. *Verifying the system/equipment is safe for re-energizing.* Equipment shall be visually inspected before energy is returned. This inspection shall include necessary measures to ensure that everyone is safely clear of the operating area, that equipment components, covers, and guards are in place, that tools or debris are removed, and that controls are off or in neutral.
10. *Removing lockout and tagout device(s)*

3.0 DEFINITIONS

Affected Employee – Employee whose job requires them to operate or use a machine or equipment on which servicing is being performed under the lockout/tagout program, or whose job requires them to work in an area where such servicing is performed.

Authorized Employee – Person who locks or tags out machines, systems, or equipment to perform work on that machine or equipment. Can include inspectors, observers, or others whose duties require them to perform LOTO to prevent harm from unexpected start-up or energization of equipment or systems.

Area Supervisor – Person designated by the responsible contractor to implement the LOTO program in that area.

Complex Lockout/Tagout Process – Process involving the placement of more locks than allowed for a Simple Lockout (see definition of a Simple Lockout), and involving one or more lockboxes.

Complex Type I Lockout/Tagout Process – Process where a single lockbox is used to store locks or tags from individual authorized employees to ensure the safety of workers.

Complex Type II Lockout/Tagout Process – Process used where operations, often involving multiple companies, are to be conducted over more than one shift. LOTO is placed on energy sources and the keys placed in one or more lockboxes by authorized or principle authorized employees and then secured by the primary authorized employee. The energy isolation devices cannot be unlocked until after the primary authorized employee, each principle authorized employee and each authorized employee have removed their personal locks from the lockbox or the energy isolation device. Used where multiple crafts and or companies are involved in sub-system lockout/tagout to ensure safety of entire system until last sub-system is safe.

Craft Supervisor – First-line supervisor responsible for the safety of work crews performing maintenance or servicing of equipment or systems.

Department Locks/Job Lock – Standardized locks maintained by the Area Supervisor to be used on points of protection in a complex lockout/tagout process. Must be red in color and have some method of identifying owner or primary authorized employee.

Energy Control Procedure – A procedure, written instruction, job safety analysis, work clearance, etc. that details specific guidance in controlling hazardous energy thus making the job safe for all workers.

Energy Isolation Device – Mechanical device that provides a positive means of control to prevent the transmission or release of energy, such as circuit breakers, disconnects, pins, blinds, valves, blocks, or double block and bleed. Push buttons, selector switches, tag-only protection, and other such devices are not positive means of control.

Danger Tag (Form GC-18) – Safety tag used in conjunction with locks associated with the lockout/tagout program.

High Voltage Electricity – Greater than 600 volts.

Kirk Key Interlock System – A permanent mechanical or electro-mechanical interlock that ensures that a predetermined sequence of operation is followed.

Lockbox – Box provided for the placement of keys to locks used to secure energy isolating devices in a complex lockout process.

Lockout/Tagout Process – Placement of locks and tags on energy-isolating devices to protect employees, equipment/machines, or systems from the release of energy.

Lockout Device – Standardized lock installed on an energy isolation device to ensure the device remains in a safe configuration, thereby protecting affected and authorized employees.

LOTO – Lockout/tagout.

Master Work Permit – Document (Form GC-1732) that authorizes performance of work and specifies protection required to ensure safety. Issued to provide a method of communication/ coordination between the person responsible for the safety in the area or system and the personnel working in the area or system. (See AEDC Safety, Health, and Environmental Standard B1.)

Personal Locks – Standardized locks issued to authorized employees, used to secure energy isolating devices or lock boxes.

Point(s) of Protection – Point or place where a lock or tag has been placed to protect workers from hazardous energy.

Simple Lockout/Tagout process – Process in which each authorized employee places three or less personal locks on energy isolating devices to protect the authorized employee. The keys for these locks are maintained by the authorized employee.

Primary Authorized Employee – Authorized employee who exercises overall responsibility for adherence to the company lockout/tagout procedure.

Principal Authorized Employee – Authorized employee who oversees or leads a group of servicing/maintenance workers (e.g., mechanical, electrical, operators, etc.).

Operational Locking/Tagging – Practice of locking reserved for those instances in which an energy source must be controlled to allow personnel to operate equipment in a specific manner. Used to ensure that equipment is kept in a specific operating mode or not inadvertently cycled. Operational locking is **never** used as the primary means of protection for those instances in which an energy source must be controlled to allow personnel to service, maintain, or modify equipment.

4.0 Requirements/Responsibilities

4.1 Requirements

4.1.1 Equipment or systems with a potential for unexpected startup, release of stored energy, and/or hazardous gases that can injure employees shall be isolated with a lock prior to the start of work. A mechanical protection device or other disconnection method that provides a positive means of energy isolation to prevent the transmission or release of energy, such as circuit breaker, disconnect, pins, blind, valve, or double block and bleed (two valves in series with a vent in between), must be installed if possible.

4.1.2 When servicing or maintenance must be performed on equipment and/or systems, written energy control procedures shall be developed to protect employees. That is, a field procedure shall be developed that is specific to the LOTO requirement for that equipment/system.

This energy control procedures shall contain:

4.1.2.1 Specific steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy

4.1.2.2 Specific steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them

4.1.2.3 Specific requirements for the testing of a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, or other energy control measures.

Procedures may take the form of a Form GC-1707 Job Safety Analysis (JSA), can be detailed on page 3 of the Master Work Permit, or can take any other form so long as it meets the requirements stated above. Principal or primary authorized employees shall be involved in the development of procedures for complex lockouts, in order to ensure the protection of workers under their care.

4.1.3 In some circumstances, employees need to temporarily restore energy to a machine or piece of equipment during servicing or maintenance to test and /or reposition the machine or piece of equipment. Temporary removal of lockout or tagout devices shall be permitted in order to perform these tasks.

4.1.4 The locks installed on energy isolation devices shall be colored-coded red to allow easy recognition throughout AEDC and to eliminate confusion with operational locks. The color-coding shall be adequate to allow anyone seeing the lock to identify it as a LOTO device. To satisfy the color code requirement, one of the following shall be accomplished:

- The lock itself can be red.

- Red tape can be applied to a different colored lock.
 - A red protective cover can be applied to the lock body.
- 4.1.5 If isolating devices will not accept a lockout device, other means of equivalent positive lockout protection shall be utilized to protect affected employees. This may mean the removal of a control handle, the disconnection of control circuits, the posting of a sentry, etc. In addition, the equivalent protection shall always include the use of a Danger Tag (Form GC-18).
- 4.1.6 Just as red color-coded locks shall be the only authorized locks for LOTO, Danger Tags shall be the only authorized tags used in the lockout/ tagout process. Tags shall be secured to the lock with a non-reusable, self-locking tie (Stock No. 5975-01-069-6592) or equivalent, and be able to withstand at least a 50-pound force (equivalent to a one-piece, all-environment nylon cable tie).
- 4.1.7 Tags shall be complete and maintained in a legible condition. Tags and writing shall be capable of withstanding the environmental conditions in which they are used. Information on the tags shall include company name, organization identification, and the name of the authorized employee being protected. For group lockouts, the name of the primary or principal authorized employee shall be used and group LOTO indicated. Enough information shall be included to allow concerned personnel to know who is responsible for the LOTO.
- 4.1.8 Integration of tags and locks shall be acceptable as long as all the required information is included. This means that personal locks with personal information embossed or laminated on the lock are permissible. Personal locks shall contain as a minimum the employees name and badge number.
- 4.1.9 Whenever replacement, major repair, or major modification of equipment, machines or systems takes place or new equipment, machines, or systems are installed, energy-isolating devices shall be designed to accommodate locks.
- 4.1.10 Under normal circumstances, no one shall place or remove another person's lock or danger tag. This does not, however, preclude a group walk-down of all points of protection that are locked out with department locks, thus allowing the individual authorized employees to place their personal locks and tags on a lockbox instead of the actual point of protection or isolating device.
- 4.1.11 Department locks utilized to secure large equipment or systems with multiple energy sources shall be standardized and color coded red. The key or isolating device number shall be on the lock, or the department/device identifier and key number shall be entered on a Danger Tag (Form GC-18) affixed to permanently assigned locks.
- 4.1.12 When department locks are used for complex LOTO processes, keys to the locks shall be placed in a lockbox. A copy of the Master Work Permit and the written LOTO procedure/work instruction shall be placed near the lockbox or be readily available.
- 4.1.12.1 Lockboxes shall be:
- Tamper-proof and clearly labeled;
 - Capable of being locked out by at least six locks;
 - Incorporate a clear (see-through) area to verify contents.
- 4.1.12.2 If possible lockboxes shall
- Contain individual hangers for each lock key used in the lockout process. Each key placed in the lockbox shall be identified with the number of the corresponding lock or isolation device.
 - Be located in close proximity to the Area Supervisor's office.
- 4.1.13 There shall be no duplicate keys for any department or personal lock used in a lockout process. For Kirk Key systems, however, which are not easily disabled, a single duplicate key is allowed and shall reside with a Senior Management Official or his/her designee. The duplicate key shall be under this official's complete control and shall only be used after the official personally ensures the safety of the personnel and equipment affected.
- 4.1.14 Authorized employees required to perform maintenance and service to equipment and systems shall normally be issued at least three personal locks to be maintained in their possession for the control of hazardous

energy. Personal locks shall be colored red and shall legibly show the name and employee number of the owner.

4.1.15 Personal locks shall have one key only. Duplicate keys shall be destroyed.

4.1.16 If it becomes necessary to remove the lock(s) and tag(s) of an absent employee, the following steps shall be performed:

4.1.16.1 Exhaust all attempts to locate and contact the absent employee at work or at home.

4.1.16.2 Obtain permission from the employee's supervisor to remove the safety lock(s) and/or tag(s).

4.1.16.3 Draft an interoffice communication to the concerned Supervisor and the Safety and Health Group, describing the circumstances and events of why the personal safety lock(s) and/or tag(s) were removed.

4.1.16.4 Upon initial return to work, the employee's supervisor or assigned representative shall promptly notify the individual of the lock(s) and/or tag(s) removal.

Note: If it becomes necessary to remove a lock(s) because of a lost key, the following steps shall be performed:

- Obtain permission from, or notify, the authorized employee.
- Coordinate with the primary and principle authorized employee.
- Route an interoffice communication to the concerned supervisor and the Safety and Health Group describing the circumstances.
- A Kirk Key Interlock system can be used at test units to secure systems and protect employees from hazardous energy; however, this system shall only be used when it can afford the same level of protection as personal or department locks and tags. Duplicate keys shall be prohibited unless maintained by and in complete control of a Senior Management Official (or designee).

4.1.17 All Complex Level II procedures shall have the coordination and approval of the Safety and Health Group. A Safety and Health Professional shall audit the procedures periodically as they are implemented to ensure that the intent of this standard is met.

4.1.18 A careful distinction shall be made between LOTO and various other locking practices, collectively referred to as Operational Locking. The LOTO procedure shall be specifically reserved for those instances in which an energy source must be controlled to allow personnel to service, maintain, or modify equipment. Operational locking may be performed for many reasons, including equipment security, programmatic purposes, or general safety; however, operational locking shall never be used as the primary means of protection during a servicing, maintenance, or modification procedure; shall not constitute a substitute for LOTO; and shall not use LOTO locks. Examples of operational locking are:

- Locked valves on fire protection systems.
- Locks on system valves to prevent accidental activation.
- A locked door to an area containing potentially hazardous equipment.

4.1.19 Nothing in this standard shall preclude an authorized employee from placing his or her personal lock directly on points of protection anytime they feel it necessary for individual protection.

4.2 Training

4.2.1 Training for lockout/tagout shall be provided in two phases. Phase I shall be generalized training on the concepts and principles of control of hazardous energy and the elements of the OSHA Lockout Tagout Program, and is conducted by the Contractor Safety and Health Group. Phase II shall be more specific training/orientation on individual workplace procedures. Phase two shall be practice for actual operations, which is much more detailed and is conducted by operations personnel. If primary or principal authorized employees are assigned to a lockout operation, they shall be directly involved in developing and delivering Phase II training/orientation.

4.2.2 All affected employees and authorized employees shall receive training on this procedure and the Company's Control of Hazardous Energy (Lockout/Tagout) Training Program at least annually, any time this procedure is revised, or when a change in machinery, equipment, or process presents new hazards.

4.2.3 Training of authorized, primary authorized, and principal authorized employees shall be required when:

- There is a change in employee job assignments that would require new responsibilities affecting the control of hazardous energy.
- A new hazard is introduced due to a change in machines, equipment, or process.
- There is a change in the energy control procedures.
- A periodic inspection reveals inadequacies in the company procedures or in employee knowledge.

4.3 Inspections

Periodic inspections shall be conducted at least annually, except as noted below, to verify the effectiveness of the company energy control procedures. Results of the inspection shall be documented on Form GC-1723, Lockout/Tagout Audit Checklist. As a minimum, the inspection shall include a demonstration of the procedures, which may be implemented through random audits and planned visual observations. All such inspections shall be certified by the Safety and Health Group and be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected. This authorized employee shall be designated by the Contractor as an Inspector and shall normally be a Safety and Health Professional assigned to the Safety and Health Group.

The Inspector shall:

- 4.3.1 Observe the procedure being implemented by a representative number of authorized employees and shall talk with all other authorized employees, even though they may not be implementing the energy control procedure.
- 4.3.2 Ensure that the energy control procedures are being properly implemented and provide an essential check on the continued utilization of the procedures.
- 4.3.3 Include a review of the responsibilities of each authorized employee implementing the procedure with that employee. Group meetings between the inspector and all authorized employees who implement the procedure are permissible.
- 4.3.4 Require that the inspector conduct this review with each affected and authorized employee when tagout only is used.
- 4.3.5 Ensure that energy control procedures used less frequently than once a year are inspected when used.

4.4 Procedures

Written instructions shall be developed by each organization having workers who may be required to isolate systems/equipment associated with a potential to release hazardous energy. AEDC operations involving systems/equipment are extremely complex and require a variety of procedures, some simple, and others complex. Accordingly, all AEDC LOTO procedures (simple or complex) shall comply with the following guidelines:

- 4.4.1 **Simple LOTO:** Each authorized employee shall place his/her personal lock or tag upon each energy-isolating device and remove it upon departure from that assignment. Each authorized employee shall verify the de-energization of the equipment.
- 4.4.2 **Complex LOTO:** The individual organization owning or having functional interest in the facility or system shall develop procedures for complex LOTO. Test facilities and related systems under the control of Test Operations shall have procedures developed by the operations organization. Utility systems under the control of the utility organization shall have procedures developed by the utility organization. In some cross functional areas, procedures shall be developed by one organization and coordinated with and approved by the other organization. In any event, all complex or group lockout/tagout procedures shall provide the following basic organizational structure:
 - 4.4.2.1 **Designation of a primary authorized employee:** This employee shall exercise primary responsibility for implementing and coordinating LOTO of hazardous energy sources for the equipment to be serviced. The primary authorized employee shall be directly involved in the development and delivery of specific (Phase II) LOTO training and shall be responsible for gaining detailed knowledge of which energy sources need to be locked out. Often this will involve research into system configuration, study of schematic drawings, and consultation with configuration managers. System engineers shall participate in the development of LOTO procedures written for systems within their jurisdiction. Should multiple crafts or groups be involved, a principal authorized employee responsible for implementing and coordinating the LOTO of hazardous energy sources for this craft or group may be appointed to assist the primary authorized employee.

- 4.4.2.2 The primary authorized employee shall coordinate with equipment operators or the principal authorized employee before and after completion of servicing and maintenance operations requiring LOTO.
- 4.4.2.3 A verification system shall be in place to ensure the continued isolation and de-energization of hazardous energy sources during maintenance and servicing operations.
- 4.4.2.4 Each authorized employee must be assured of his/her right to verify individually that the hazardous energy has been isolated and/or deenergized.
- 4.4.2.5 When more than one crew, craft, department, etc., is involved, each separate group of servicing/maintenance personnel can be accounted for by a principal authorized employee from each group. If one is assigned, each principal authorized employee shall be responsible to the primary authorized employee for maintaining accountability of each worker in that specific group in conformance with the procedure. No person shall remove another person's LOTO device, unless the provisions of paragraph 4.1.16 are met.
- 4.4.2.6 Each complex Type II lockout procedure developed shall be coordinated with and approved by the Contractor Safety and Health Group. Unless otherwise specified by supervision, the primary authorized employee shall be responsible for coordinating this effort. Normally, a Safety and Health Professional assigned to the Safety and Health Group will audit the procedure sometime during the LOTO process.
- 4.4.3 Examples of process flow diagrams for group lockout/tagout are provided in the annexes to this standard. It is emphasized that these flow diagrams are *suggested* methods offered for illustration only. In practice, the safety of each LOTO shall depend on the development of individual procedures specific to the current situation. Supervision shall appoint adequate responsible personnel to oversee complex LOTO operation.
- 4.4.4 When LOTO devices must be temporarily removed from the energy-isolating device so that the equipment or component can be energized for testing or positioning, the following sequence of actions are required and shall be documented in a procedure before testing can take place:
- Notify the affected employees, authorized employees, and the principle/primary authorized employee (if complex LOTO).
 - Clear the equipment of tools and materials.
 - Remove employees from the machine or equipment area and ensure that required tools or fixtures are safely and properly positioned.
 - Remove all repositioning and blocking devices and return all controls and valves to their normal operating positions.
 - Energize and proceed with testing or positioning.
 - De-energize all systems and reapply lockout/tagout measures to continue the servicing, maintenance, or modification of the equipment.

4.5 Responsibilities

4.5.1 Contractor Management shall:

- 4.5.1.1 Develop and maintain an effective lockout/tagout program that complies with this standard.
- 4.5.1.2 Conduct and certify a periodic annual inspection of the program.
- 4.5.1.3 Appoint exempt or craft employees, when necessary, to act as primary authorized employees and principal authorized employees, and ensure they are directly involved in the development and presentation of Phase II training/orientation on lockout/tagout procedures.

4.5.2 The Supervisor or Master Work Permit Issuing Official shall:

- 4.5.2.1 Ensure written lockout/tagout procedures and instructions are current and correct according to this standard, and that Complex Type II procedures are coordinated with and approved by the Safety and Health Group; issue work clearances; and maintain an adequate supply of locks/tags and various lockout devices (valve lockout devices, lockout hasps, circuit breaker lockout devices, chains, etc.)
- 4.5.2.2 Provide a knowledgeable employee to assist authorized employees in locating and placing locks and tags on isolating devices.

4.5.2.3 Act as primary or principal authorized employees when appointed.

4.5.2.4 Participate in developing procedures and providing specific training for authorized, primary authorized, and principal authorized employees on the implementation of LOTO procedures and controls developed to protect employees from hazardous energy.

4.5.3 Craft Supervisors shall:

4.5.3.1 Ensure authorized and affected employees under their authority receive basic and refresher LOTO training.

4.5.3.2 Ensure all employees under their authority follow all LOTO requirements and instructions.

4.5.3.3 Participate in developing procedures and providing specific training for authorized, primary authorized, and principal authorized employees on the implementation of LOTO procedures and controls developed to protect employees from hazardous energy.

4.5.3.4 Act as primary authorized employee as required.

4.5.4 Primary Authorized Employees shall:

4.5.4.1 Serve as the key employee in complex LOTO processes.

4.5.4.1 Act as the overall employee safety and health representative for complex LOTO processes.

4.5.4.1 Ensure the provisions of this standard are carried out to ensure safety of employees under their responsibility.

4.5.4.1 Participate in Phase II training/orientation for personnel involved in LOTO.

4.5.4.1 Provide direction and guidance to authorized and principal authorized employees with respect to control of hazardous energy and LOTO procedures.

4.5.5 Principal Authorized Employees shall:

4.5.5.1 Serve as the key employee in group or craft lockout/tagout processes.

4.5.5.2 Act as the overall employee safety and health representative for group or craft complex LOTO processes.

4.5.5.3 Ensure the provisions of this standard are carried out to ensure safety of employees under their responsibility.

4.5.5.4 Provide direction and guidance to authorized employees with respect to control of hazardous energy and LOTO procedures.

4.5.5.5 Participate in Phase II training for personnel involved in LOTO.

Note: Principle authorized employees may be assigned for any complex lockout, but are especially effective when multiple crafts, multiple shifts, more than one company, multiple lockboxes, etc., are required.

4.5.6 Authorized Employees shall:

4.5.6.1 Obtain a department lock from the Area Supervisor when protection is required and the employee does not have a personal lock for personal protection. The employee shall place the lock on the isolation device or lockbox and attach a Danger Tag (Form GC-18) with his/her name and organization shown on the tag.

4.5.6.2 Comply with all requirements found in this standard.

4.5.6.3 Receive guidance from principal and primary authorizing employees.

4.5.6.4 Not remove locks and tags without proper authorization.

4.5.6.5 Place their personal locks on the lock box and retain the key. When protection is no longer required, employees shall remove their personal locks and tags from point(s) of protection or from the lock box.

4.5.6.6 Place their personal locks on the lockbox, along with other authorized employees, when other crews are working simultaneously on the same equipment, machines, or systems.

4.5.6.7 When using a complex LOTO process, the authorized employee identified on the work clearance ensures the LOTO process is performed as stated on the written lockout/tagout instruction. If a lockbox is used, the employee shall place his/her personal lock on the lockbox. If more than one authorized employee is to be protected by the lockout, each of those authorized employees shall be responsible for verifying the contents of the lockbox prior to placing his/her personal lock on the lockbox.

4.5.7 The contract monitor for outside contractors shall

Ensure that outside contractors comply with the provisions of this standard.

4.5.8 The Safety and Health Group shall:

- 4.5.8.1 Provide initial training and, upon request, refresher training to affected, authorized primary authorized and principal authorized employees.
- 4.5.8.2 Assist in the development of systems and equipment lockout/tagout strategies.
- 4.5.8.3 Develop and perform annual audits to determine compliance with this standard.
- 4.5.8.4 Provide audit information to Area Directors, Area Supervisors and the Air Force Safety Office.
- 4.5.8.5 Provide a review and update of this standard when changes are required, not to exceed every two years.
- 4.5.8.6 Ensure a Safety and Health Professional is available to coordinate and approve all Complex Type II procedures. This Safety and Health Professional shall also audit procedures periodically to ensure compliance with this standard. (See Annex C--Process Flow for Complex II Lockout/Tagout.)

5.0 References

AEDC Safety, Health, and Environmental Standard B1, Master Work Permit
AEDC Safety, Health, and Environmental Standard B4, High Voltage Electrical Work
AEDC Safety, Health, and Environmental Standard B6, Low Voltage Electrical Safety Related Work Practices
OSHA 29 CFR 1910.147: The control of hazardous energy (lockout/tagout)

Annexes

- A. Simple Lockout/Tagout Process
- B. Complex Type I Lockout/Tagout Process
- C. Complex Type II Lockout/Tagout Process

Annex A – Simple LockOut/Tagout Process

Affected Employee	Authorized Employee	Supervisor (Responsible Person)
	1. Receive job assignment – Master Work Permit (GC-1732).	1. Assign Job/obtain or generate Master Work Permit (GC-1732).
	2. Obtain procedure for control of hazardous energy or develop one through use of the JSA process.	2. Develop procedure for control of hazardous energy or ensure one has been developed.
	3. Locate and identify energy source to be isolated.	
1. Receive briefing on lockout in area.	4. Brief affected employees.	
	5. Apply LOTO to all energy sources.	
	6. Verify that energy source has been rendered safe.	
	7. Perform work.	
	8. Inspect work area to ensure non essential items are removed and employees are safely positioned.	
	9. Remove LOTO.	
2. Receive info that LOTO is complete.	10. Notify affected employees.	
	11. Restore power / energy.	3. Assume control of operational system. Inspect area to ensure no hazards exist. Sign release section of Master Work Permit and maintain copy for six months.

Annex B – Complex Type I Lockout/Tagout Process

Affected Employee	Authorized Employee	Primary Authorized Employee	Supervisor / Responsible Person	Safety and Health Professional
	1. Receive job assignment - Master Work Permit (GC-1732).	1. Receive job assignment - Master Work Permit (GC-1732).	1. Assign Job/Obtain Master Work Permit (GC-1732).	
	2. Obtain procedure for control of hazardous energy.	2. Develop procedure for complex LOTO, notify Safety and Health Group.		1. Receive notification of LOTO (optional)
1. Receive information on complex LOTO affecting work conditions.	3. Receive training on complex LOTO.	3. Conduct Phase II training for complex LOTO. Notify affected employees of complex LOTO in area.	2. Provides locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware for isolating, securing or blocking of machines or equipment from energy	2. Verify training of involved employees (optional)
		4. Locate/identify energy source to be isolated.	3. Provide assistance in locating and identifying energy source to be isolated.	3. Evaluate and approve complex LOTO procedure. (optional)
		5. Apply Lock to points of protection for entire system.		
	4. Personally verify effectiveness of LOTO – can be done in a group walk-down.	6. Place keys to points of protection locks in Lock-Box and place personal lock on Lock-Box.		
	5. Place personal lock on Lock-Box.	7. Oversee and coordinate the entire system LOTO to include periodic checks to verify continued isolation of hazardous energy.		4. Inspect and certify entire LOTO for compliance. (optional)
	6. Perform work			
2. Receive information that complex LOTO is complete.	7. At completion of work remove personal lock from Lock-Box	8. At completion of work ,inspect work area to ensure non essential items are removed and employees are safely positioned		
	8. Return to assigned work location.	9. Remove personal lock from Lock-Box and remove LOTO from points of protection		
		10. Return control of system back to operations – may sign and date release section of Master Work Permit.	4. Assume control of operational system. Inspect area to ensure no hazards exist. Sign release section of Master Work Permit; maintain copy for six months.	

Annex C – Complex Type II Lockout/Tagout Process

Affected Employee	Authorized Employee	Primary Authorized Employee	Principle Authorized Employee	Supervisor / Responsible Person	Safety and Health Professional
	1. Receive job assignment- work clearance.	1. Receive job assignment - Master Work Permit (GC-1732).	1. Receive job assignment - Master Work Permit (GC-1732).	1. Assign Job/Obtain Master Work Permit (GC-1732).	
	2. Obtain procedure for control of hazardous energy.	2. Develop procedure for complex LOTO, notify Safety and Health Group.	2. Assist in development of procedure for complex LOTO .		1. Receive notification of LOTO
1. Receive briefing LOTO to begin in area.	3. Receive training on complex LOTO.	3. Conduct Phase II training for complex LOTO. Notify affected employees of LOTO in the area.	3. Assist in the presentation of Phase II training for work group represented.	2 Provide locks, tags, key blocks, chains, wedges, adapter pins, self-locking fasteners, or other hardware to isolate, secure or block machines or equipment from energy .	2. Verify training of involved employees
		4. Locate/identify energy source to be isolated.	4. Locate/identify energy source to be isolated.	3. Provide assistance in locating and identifying energy source to be isolated.	3. Evaluate and approve complex LOTO procedure.
		5. Apply Lock to points of protection for entire system .Primary or Principle	5. Assist Primary by applying Lock to points of protection for represented crew.		
	4. Personally verify effectiveness of LOTO – can be done in a group walk-down.	6. Place keys to points of protection locks in Lock-Box and place personal lock on Lock-Box. Ensure all employees are satisfied with verification.	6. After Points of Protection keys are in Crew Lock-Box apply personal Lock to Crew Lock-Box.		
	5. Place personal lock on Lock-Box.	7. Place personal lock on Lock-Box that contains keys to all other locks or lockboxes used in this LOTO.	7. Place key to personal Lock in Lock-Box to be secured by Primary.		
	6. Perform work.	8. Oversee/coordinate entire system LOTO to include periodic checks to verify continued isolation of energy.	8. Oversee and coordinate the LOTO for crew represented.		
2. Receive briefing LOTO to end in area.	7. At completion of work, remove personal lock from Lock Box as instructed by Principle/Primary Authorized Employee.	9. Remove personal lock from Lock-Box, allowing Principles to begin removing their personal locks from Crew Lock-Box, or remove LOTO from system points of protection.	9. At completion of work inspect work area to ensure non essential items are removed and employees are safely positioned		
	8. Return to assigned work location.		10. Remove personal lock from Crew Lock-Box and remove LOTO from points of protection.		
		10. Return control of system back to operations – may sign and date release section of Master Work Permit.	11. Return control of system back to operations – may sign and date release section of Master Work Permit.	4. Assume control of operational system. Inspect area to ensure no hazards exist. Sign release section of Master Work Permit; maintain copy for six months.	